## AMENDMENT TO THE CLAIMS

Please **CANCEL** claims 1, 3-7, 9-25 and 28-51

Please **ADD** claim 52-91.

No new matter has been added. This listing of claims will replace all prior versions, and listings, of claims in the application.

**LISTING OF CLAIMS**

1-51 (Canceled)

52. (New) An electrochemical sensor for measuring an analyte, comprising:

a first working electrode, wherein the first working electrode comprises a first set of redox species, and wherein the first set of redox species comprises one or more redox species that are sensitive to said analyte;

a second working electrode, wherein the second working electrode comprises a second set of redox species, and wherein the second set of redox species comprises one or more redox species that are insensitive to said analyte:

a counter electrode;

a reference electrode;

means for applying a square wave potential sweep between a first and a second pair of electrodes, wherein the first pair of electrodes comprises the first working electrode and the reference electrode and the second pair of electrodes comprises the second working electrode and the reference electrode; and

means for detecting relative shifts between a first peak and a second peak in a square wave voltammogram, wherein the first peak is produced by one of oxidation and reduction of the first set of redox species and the second peak is produced by one of oxidation and reduction of the second set of redox species.

53. (New) The electrochemical sensor in accordance with claim 52, wherein the means for applying the square wave potential sweep between the first and the second pair of electrodes comprises at least one of a voltage supply and a potentiostat.

54. (New) The electrochemical sensor in accordance with claim 52, wherein said analyte comprises protons.

55. (New) The electrochemical sensor in accordance with claim 52, wherein the means for detecting relative shifts between the first peak and the second peak in the square wave voltammogram comprises a signal processor.

56. (New) The electrochemical sensor in accordance with claim 55, wherein the signal processor processes a concentration of said certain analyte form relative shifts between the first peak and the second peak.

57. (New) The electrochemical sensor in accordance with claim 52, wherein the first set of redox species comprises one or more redox species sensitive to pH; and the second set of redox species comprises one or more redox species insensitive to pH.

58. (New) The electrochemical sensor in accordance with claim 57, wherein the one or more redox species sensitive to pH contain a hydroquinone or quinone moiety.

59. (New) The electrochemical sensor in accordance with claim 57, wherein the one or more species insensitive to pH contain one of a ferrocene moiety, a ruthenocene moiety and a hexacyanometallate moiety.

60. (New) The electrochemical sensor in accordance with claim 52, wherein the first set of redox species is immobilized onto a surface of a conductive substrate.

61. (New) The electrochemical sensor in accordance with claim 52, wherein the first set of redox species is immobilized onto a surface of a carbon electrode.

62. (New) The electrochemical sensor in accordance with claim 60, wherein the immobilization is achieved by direct mixing of the first set of redox species with carbon

and sealing of the mixture of the first set of redox species and the carbon in a binder matrix on the conductive substrate.

63. (New) The electrochemical sensor in accordance with claim 60, wherein the immobilization is achieved by direct mixing of the first set of redox species with carbon and pressing the mixture of the first set of redox species and the carbon into a cavity in the conductive substrate to form a compact layer.

64. (New) The electrochemical sensor in accordance with claim 61, wherein the carbon electrode comprises one of glassy carbon spheres, carbon nanotubes, graphite powder and boron doped diamond powder.

65. (New) The electrochemical sensor in accordance with claim 62, wherein the binder matrix comprises one of epoxy resin, the redox species sensitive to said analyte and mineral oil.

66. (New) The electrochemical sensor in accordance with claim 60, wherein the immobilization comprises direct adsorption.

67. (New) The electrochemical sensor in accordance with claim 52, wherein the first working electrode comprises the first set of redox species chemically attached to a conductive substrate.

68. (New) The electrochemical sensor in accordance with claim 67, wherein the chemical attachment is made via a chemical reduction of a diazo moiety.

69. (New) The electrochemical sensor in accordance with claim 67, wherein the first set of redox species is covalently attached to a surface of the conductive substrate.

70. (New) The electrochemical sensor in accordance with claim 69, wherein the surface comprises of a material from the group consisting of one of a basal plane pyrolytic graphite, an edge plane pyrolytic graphite, a glassy carbon, a highly orientated pyrolytic graphite or some combination thereof.

71. (New) The electrochemical sensor in accordance with claim 67, wherein the second working electrode comprises a second set of redox species immobilized on a second conductive substrate.

72. (New) The electrochemical sensor in accordance with claim 52, wherein the second working electrode comprises the second set of redox species chemically attached to a conductive substrate.

73. (New) The electrochemical sensor in accordance with claim 52, wherein the first working electrode comprises the first set of redox species screen printed onto a conductive substrate.

74. (New) The electrochemical sensor in accordance with claim 52, wherein the counter electrode comprises one of platinum, steel or carbon.

75. (New) The electrochemical sensor in accordance with claim 52, wherein the reference electrode comprises one of silver (Ag), silver chloride (AgCl) or some combination thereof.

76. (New) The electrochemical sensor in accordance with claim 52, wherein the first working electrode and the second working electrode are crossed connected to a single output of the means for applying the square wave potential sweep.

77. (New) The electrochemical sensor in accordance with claim 52, further comprising:

a protector configured to protect at least one of the first working electrode and the second working electrode, wherein the protector comprises one of a frit, a fiber mesh, a non-conducting wire mesh, a porous polymer film or some combination thereof.

78. (New) A downhole tool for measuring characteristic parameters of wellbore effluents comprising the electro-chemical sensor in accordance with claim 52.

79. (New) The electrochemical sensor in accordance with claim 52, wherein

the electrochemical sensor is configured for use in a reservoir sampling tool.

80. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for use in a production logging tool.

81. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for use in a measurement-while-drilling tool.

82. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for use in a surface testing module.

83. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for use in a surface pumping module, the surface pumping module delivering well treatment fluids.

84. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for integration into part of a sensor string installed permanently or temporarily within a monitoring, production, or injection well in aquifers.

85. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured to be permanently installed in a pipeline for transporting hydrocarbons.

86. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured to be permanently installed on a downhole pump.

87. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured for use on one of a downhole treatment monitoring tool for stimulation or formation damage removal, an end of a tubing section, a drillpipe and a coiled tubing unit.

88. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor forms part of a permanent monitoring system within a well, the sensor being disposed in the well behind casing.

89. (New) The electrochemical sensor in accordance with claim 52, wherein the electrochemical sensor is configured to monitor CO2 sequestration.

90. (New) A method for measuring a certain analyte, comprising:

contacting a first working electrode, a second working electrode and a counter electrode with a fluid comprising said analyte, wherein the first working electrode comprises a first set of redox species sensitive to said analyte and the second working electrode comprises a second set of redox species insensitive to said analyte;

applying a first square wave potential sweep between the first working electrode and a reference electrode;

applying a second square wave potential sweep between the second working electrode and a reference electrode;

determining a first potential on the square wave potential sweep, wherein the first potential corresponds to a first peak current flow between the first working electrode and the reference electrode, and wherein the first peak current flow is produced by oxidation or reduction of the first redox species;

determining a second potential on the square wave potential sweep, wherein the second potential corresponds to a second peak current flow between the second working electrode and the reference electrode, wherein the second peak current flow is produced by oxidation or reduction of the second redox species; and

using the relative separation between the first and second potentials to measure the certain analyte.

91. (New) The method of claim 91, further comprising:

cross-connecting the first and second working electrode, wherein the first and the second square potential sweeps comprise a single square wave potential sweep.